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DESIGN AND CHARACTERIZATION OF LAYERED SOLID FROM THE INTERCALATION OF ORGANIC MOLECULES INTO TRANSITION METAL NITROPRUSSIDES

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The design and development of hybrid materials obtained from the assembly of organic and inorganic units constitutes one of the most fertile and emerging areas within the science of materials. The wide variety of building blocks that exist has allowed the construction of a large variety of 1D, 2D and 3D structures that have received great attention for their attractive properties that have found a wide variety of applications in fields such as catalysis, energy storage, the development of electronic devices, biomedicine, and environmental remediation, among others. Laminar materials are the result of preferential growth in two dimensions related to the electronic structure of the atoms involved. These materials can also be obtained from 3D lattices, in which growth in the axial direction is inhibited. Particularly the pentacyanonitrosilferrate $[Fe(CN)_5NO]^{2-}$ anion is commonly known as nitroprusside ion, can act as a bridge unit between coordinating metal centers to give rise to a series of coordination compounds which is usually obtained as 3D solids, except phase of Cu(II) which is obtained in laminar form. In this contribution, we used the different organic molecules as 1-methyl-2-Pyrrolidone (1m2p), Pyridine (Py) and Pyrazine (Pyz) to inhibit the axial growth of the transition metal nitroprussiate phases for the remaining metals (M = Mn, Fe, Co, Ni, Zn). In the interlayer region, organic molecules from neighbouring sheets interact through their dipole and quadrupole moments, which are forces of physical nature. As the net electrostatic interaction between neighbouring molecules is attractive, their π-clouds partially overlap, which contributes to the stability of the 3D framework through dispersive-type forces. These novel materials were separated by centrifugation, washed and then characterized by chemical analyses, XRD, IR, UV–Vis, TG, magnetic data and DSC Thermal Analysis.

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